

Appendix K Sprint Disaster Recovery Plan

Sprint's comprehensive Disaster Recovery Plan developed for North Carolina details the methods Sprint will utilize to cope with specific disasters. The plan includes quick and reliable switching of calls, network diagrams identifying where traffic will be rerouted if vulnerable circuits become inoperable, and problem reporting with escalation protocol. Besides service outages, the North Carolina Disaster Recovery Plan applies to specific disasters that affect any technical area of Sprint's Relay network.

The first line of defense against degradation of North Carolina is the Intelligent Call Router (ICR) technology that Sprint employs. During a major or minor service disruption, the ICR feature bypasses the failed or degraded facility and immediately directs calls to the first available agent in any of Sprint's eleven fully inter-linked TRS Call Centers. State-specific call processing software resides at each of Sprint's Relay Call Centers. Communications Assistants (CAs) are trained in advance to provide service to other States; the transfer of calls between centers is transparent to users.

Beyond the ICR, Sprint's Disaster Recovery Plan details the steps that will be taken to deal with any problem, and restore North Carolina to its full operating level in the shortest possible time.

North Carolina Notification Procedure

To provide North Carolina with the most complete and timely information on problems affecting their TRS, the trouble reporting procedure for North Carolina will include three levels of response:

- A 3-hour verbal report
- A 24-hour status report
- A comprehensive final report within 5 business days.

Sprint will notify Telecommunications Access of North Carolina within three hours if a service disruption of 30 minutes or longer occurs. For service disruptions occurring outside normal business hours, the initial report will be provided by 8:30 AM on the next business day. This initial report will explain how the problem will be corrected and an approximate time when full service will be restored. Within 24 hours of the service disruption, an intermediate report provides problem status and more detail of what action is necessary. In most cases, the 24-hour report reveals that the problem has been corrected and that full service to North Carolina has been restored. The final comprehensive written report, explaining how and when the problem occurred, corrective action taken, and time and date when full operation resumed will be provided to the North Carolina Administrator within five business days of return to normal operation. Examples of service disruption to North Carolina include:

- ACD failure or malfunction
- Major transmission facility blockage
- Threat to North Carolina CAs safety or other CA work stoppage
- Loss of CA position capabilities.

Performance at each Sprint relay center is monitored continuously 24 hours a day, seven days a week from Sprint's Enhanced Services Operation Control Center (ESOCC) in Overland Park, KS.

Disaster Recovery Procedures

If the problem is within the relay center serving North Carolina, maintenance can usually be performed by the on-site technician, with assistance from Sprint's ESOCC. If the problem occurs during non-business hours and requires on-site assistance, the ESOCC will page the technician to provide service remedies. Sprint retains hardware spares at each center to allow for any type of repair required without ordering additional equipment (except for complete loss of a center).

Time Frames for Service Restoration

Complete or Partial Loss of Service Due to Sprint Equipment or Facilities

- **Sprint Call Center Equipment**—A technician is on-site during the normal business day. The technician provides parts and / or resources necessary to expedite repair within two hours. Outside of the normal business day a technician will be on-site within four hours. The technician then provides parts and /or resources necessary to expedite repair within two hours.
- **Sprint or Telco Network Facilities**—For an outage of facilities directly serving North Carolina, incoming TRS calls will immediately be routed to one of ten other centers throughout the US. No calls will be lost. Repair of fiber or network facilities typically requires less than eight hours.
- **Due to Utilities or Disaster at the Center**—Immediate rerouting of traffic occurs with any large-scale center disaster or utility failure. Service is restored as soon as the utility is restored, provided the Sprint equipment has not been damaged. If the equipment has been damaged the service restoration for Sprint equipment (above) applies.
- **Due to Telco Facilities Equipment**—A Telco equipment failure will not normally have a large effect on TRS traffic within the state unless it occurs on Telco facilities directly connected to the call center. In this case, normal Sprint traffic rerouting will apply.

For a failure at a Telco central office in (CITY), for example, only local (CITY) residents would be affected until the Telco has performed the necessary repairs. For situations like this, it will be at Sprint's discretion to dispatch a technician. The normal Telco escalation procedures will apply. The Telco escalation process is all during the normal business day; therefore, a trouble may be extended from one day to the next.

Trouble Reporting Procedures

The following information is required when North Carolina user is reporting trouble:

- Service Description ("North Carolina")
- Callers Name
- Contact Number

- Calling to/Calling from, if applicable
- Description of the trouble.

Service disruptions or anomalies that are identified by North Carolina users may be reported to the Sprint Relay Customer Service 800 number (800-877-0996) at any time day or night, seven days a week. The Customer Service agent creates a trouble ticket and passes the information on to the appropriate member of Sprint's Maintenance Team for action. Outside the normal business day, the ESOC will handle calls from the Customer Service agents 24 hours a day, 7 days a week. The Maintenance Team recognizes most disruptions in service prior to customers being aware of any problem. Site technicians are on call at each of Sprint's 11 TRS Call Centers to respond quickly to any event, including natural disasters.

Mean Time to Repair (MTTR)

MTTR is defined and detailed in Tables A-1 and A-2:

Table A-1 Time to Investigate + Time to Repair + Time to Notify

Time to Investigate	The time needed to determine the existence of a problem and its scope.
Time to Repair	Repair time by Field Operations plus LEC time, if applicable.
Time to Notify	From the time repair is completed to the time the customer is notified of repair completion.

Table A-2 Current MTTR Objectives

Switched Services	8 Hours
Private Lines	4 Hours (electronic failure)
Fiber Cut	8 Hours

Sprint's Mean Time to Repair is viewed from the customer's perspective. A critical element in the equation is the Time to Notify, because Sprint does not consider a repair complete until the customer accepts the circuit back as satisfactory.

Escalation Procedures

If adequate results have not been achieved within two hours, North Carolina user may escalate the report to the next level. Table A-3 details the escalation levels.

Table A-3 Escalation Levels

Escalation Level	Contact	Phone
2	Regional Maintenance Manager	Office Phone Number (913) 315-8047 Pager – 800-724-3329, Pin 3856901 (Numeric) Pager – 800-724-3508, Pin 3856901 (text)
3	Senior Manager, Technical Staff	Office Phone Number (913) 315-7788

Service Reliability

Sprint's service is provided over an all-fiber sophisticated management control networks support backbone networks with digital switching architecture that. These elements are combined to provide a highly reliable, proven, and redundant network. Survivability is a mandatory objective of the Sprint network design. The Sprint network minimizes the adverse effect of service interruptions due to equipment failures or cable cuts, network overload conditions, or regional catastrophes.

A 100 percent fiber-optic network, with significant fiber miles in North Carolina, provides critical advantages over the other carriers. These advantages include:

- **Quality**

Since voice or data are transmitted utilizing fiber optic technology, the problems of outdated analog and even modern microwave transmission simply do not apply. Noise, electrical interference, weather-impacting conditions, and fading are virtually eliminated.

- **Economy**

The overall quality, architecture, and advanced technology of digital fiber optics makes transmission so dependable that it costs us less to maintain, thereby passing the savings onto our customers.

- **Expandability**

As demand for network capacity grows, the capacity of the existing single-mode fiber can grow. Due to the architecture and design of fiber optics, the capacity of the network can be upgraded to increase 2,000-fold.

- **Survivability**

Network survivability is the ability of the network to cope with random disruptions of facilities and/or demand overloads. Sprint has established an objective to provide 100 percent capability to reroute backbone traffic during any single cable cut. This is a significant benefit to North Carolina, and a competitive differentiation of the Sprint network.

Currently, Sprint has over 23,000 miles of its fiber network in place and in service, with a fiber point of presence (POP) in every Local Access Transport Area (LATA). The XXXX LATAs in North Carolina are served by XXXX Sprint POPs. There are plans for additional fiber mileage, additional POPs, and added route diversity. There are XXXX POPs in service on the network. With XXXX POPs in the state, all areas will be adequately serviced by Sprint.

Switched services are provided via 49 Northern Telecom DMS-250/300 switches at 20 locations nationwide. These DMS-300s located in New York, NY, San Francisco, CA, and Stockholm, CA serve as international gateways. The remaining 29 switches provide switching functions for Sprint's domestic switched services. North Carolina service is provided by the DMS-300 located in XXXX, with other closely located facilities also serving North Carolina.

Interconnection of the 49 switches is provided in a non-hierarchical manner. This means that inter-machine trunk (IMT) groups connect each switch with all other switches within the network. Each of these IMT groups is split and routed through the Sprint fiber network over SONET route paths for protection and survivability. As an extra precaution to preclude any call blockage, Dynamically Controlled Routing (DCR) provides an additional layer of tandem routing options when a direct IMT is temporarily busy.

Reliability is ensured through a corporate commitment to maintain or surpass our system objectives. Beginning with the network design, reliability and efficiency are built into the system. Sprint continues to improve the network's reliability through the addition of new technologies such as Digital Cross-connect Systems, SONET, and Signaling System 7.

The effectiveness of this highly reliable and survivable network is attributed to the redundant transmission and switching hardware configurations, SONET ring topology, and sophisticated network management and control centers. These factors combine to assure outstanding network performance and reliability for North Carolina.

Network Criteria

System Capacity

The Sprint network was built with the capacity to support every interLATA and intraLATA call available in the US. With the continuing development of network fiber transmission equipment to support higher speeds and larger bandwidth, the capacity of the Sprint network to support increasing customer requirements and technologies is assured well into the future.

Service Restoration

Sprint provides for the restoration of service in the event of equipment malfunctions, isolated network overloads, major network disruptions and national/civil emergency situations. In the event of service disruption due to Sprint's equipment, service typically is restored within four hours after notification. Sprint does everything possible to prevent a total outage at its switch sites or at any of its' POPs through the use of advanced site designs. All processors, memory, and switch networks within our switches are fully redundant. All switch sites are protected by uninterruptible power supplies and halon systems planned in conjunction with local fire departments. Most of our new sites are earth sheltered to increase survivability. A multi-pronged program is used to minimize outages:

1. Do everything possible to minimize the impact of a "single point of failure." This includes:
 - Diversification of all facilities demands between switch sites. All switch sites are connected to the long haul network over at least two separate Sprint fiber routes; many have three paths.
 - Deployment of multiple switches at large switching centers. This prevents a single switch outage from disabling the site.
2. Have systems in place allowing for the rapid redeployment of network resources in case of a catastrophic outage. Fiber cuts, which can affect thousands of calls at several

locations, are sometimes unavoidable. Response to these outages is maximized through the following procedures:

- Utilization of established plans to respond effectively to these outages.
- The capability to rapidly deploy network transmission facilities when needed.
- Immediate execution of alternate routing in the digital switches and cross-connect systems to assist in the handling of temporary network disruptions and forced overloads.

The entire spectrum of survivability needs, expectations, and requirements can be met by the proper engineering of customer and Sprint switches and facilities.

Fiber Backbone Loop Topology and Reconfiguration

Fiber optic cable routes are designed to include redundant capacity to insure survivable fiber optic systems. Sprint's SONET network, using four fiber bi-directional line switched ring capability, allows automatic switching to alternate paths to provide for traffic rerouting in the event of a route failure. The SONET fiber optic backbone topology is currently designed with more than 100 overlapping rings to ensure sufficient alternate paths for total network survivability. Operating SONET rings currently serve North Carolina, with ring augmentation planned for 2002.

Sprint Route Outage Prevention Programs

Call Before You Dig Program

This program uses a nationwide 1-800 number interlinked with all local/state government utility agencies as well as contractors, rail carriers, and major utilities. Sprint currently receives in excess of 60,000 calls per month for location assistance over the 23,000-mile fiber network.

Awareness Program

This Sprint program proactively contacts local contractors, builders, property owners, county/city administrators, and utility companies to educate them on Sprint's cable locations and how each can help eliminate cable outages.

Route Surveillance Program

This is a Network Operations department program using Sprint employees to drive specific routes (usually 120 miles) and visually inspect the fiber cable routes. This activity is performed an average of 11.6 times per month or approximately once every 2-3 days.

Technician Program

Technicians are stationed at strategic locations and cover an area averaging 60 route miles. Each technician has emergency restoration material to repair fiber cuts on a temporary basis. Other operations forces within a nominal time frame accomplish total repair.

Fiber/Switch Trending Program

This includes a weekly summary of equipment failure events highlighting bit error rate (BER) and cable attenuation. As a result, Sprint identifies potential equipment problems and monitors performance degradation to establish equipment-aging profiles for scheduled repair, replacement, or elimination. Aging profiles are computer-stored representations of the characteristics of a fiber splice. The profile is stored at the time the splice is accepted and put into service. A comparison of the original profile and current profile are compared for performance degradation. Maintenance is scheduled based on this type of monitoring.

Network Management and Control Systems

The Sprint network is managed and controlled by a National Operations Control Center (NOCC) located in Overland Park, KS. As a back up, a secondary NOCC is located in Lenexa, KS. The NOCC is designed to provide a national view of the status of the network as well as to provide network management from a centralized point. The NOCC interfaces with the Regional Control Centers (RCCs) to obtain geographical network status. The RCCs are responsible for maintenance dispatch and trouble resolution, and are designed to provide redundancy for each other and back-up status for the NOCC.

The NOCC and RCC work closely with the ESOCC in cases where a network problem may affect North Carolina operations. In cases such as these, the NOCC or RCC immediately alerts the ESOCC of the situation so that appropriate steps can be taken to minimize service impacts. The NOCC and RCCs also serve as reference points for the ESOCC when problems are detected in the TRS center that are not the result of internal center operations.

Network Management

Commitment to a digital fiber optic network permits Sprint to use a single transmission surveillance protocol to integrate internal network vendor equipment. This enhances Sprint's ability to automate and provide preventive, near real-time detection and isolation of network problems. The controlling principle is identification and correction of potential problems before they affect the North Carolina call capabilities.

Sprint divides the major functional responsibilities, facilities maintenance and network management, into a two-level organization which maximizes network efficiencies and customer responsiveness. The first level consists of the RCCs located in Atlanta and Sacramento. RCC personnel focus on the performance of individual network elements within predetermined geographical boundaries. The second level is the NOCC in Kansas City that oversees traffic design and routing for Sprint's 23,000-mile fiber optic network and interfaces.

This two-level operational control organization, combined with architectural redundancies in data transport and surveillance, control and test systems, ensures an expedited response to potential problems in both switched and private line networks.